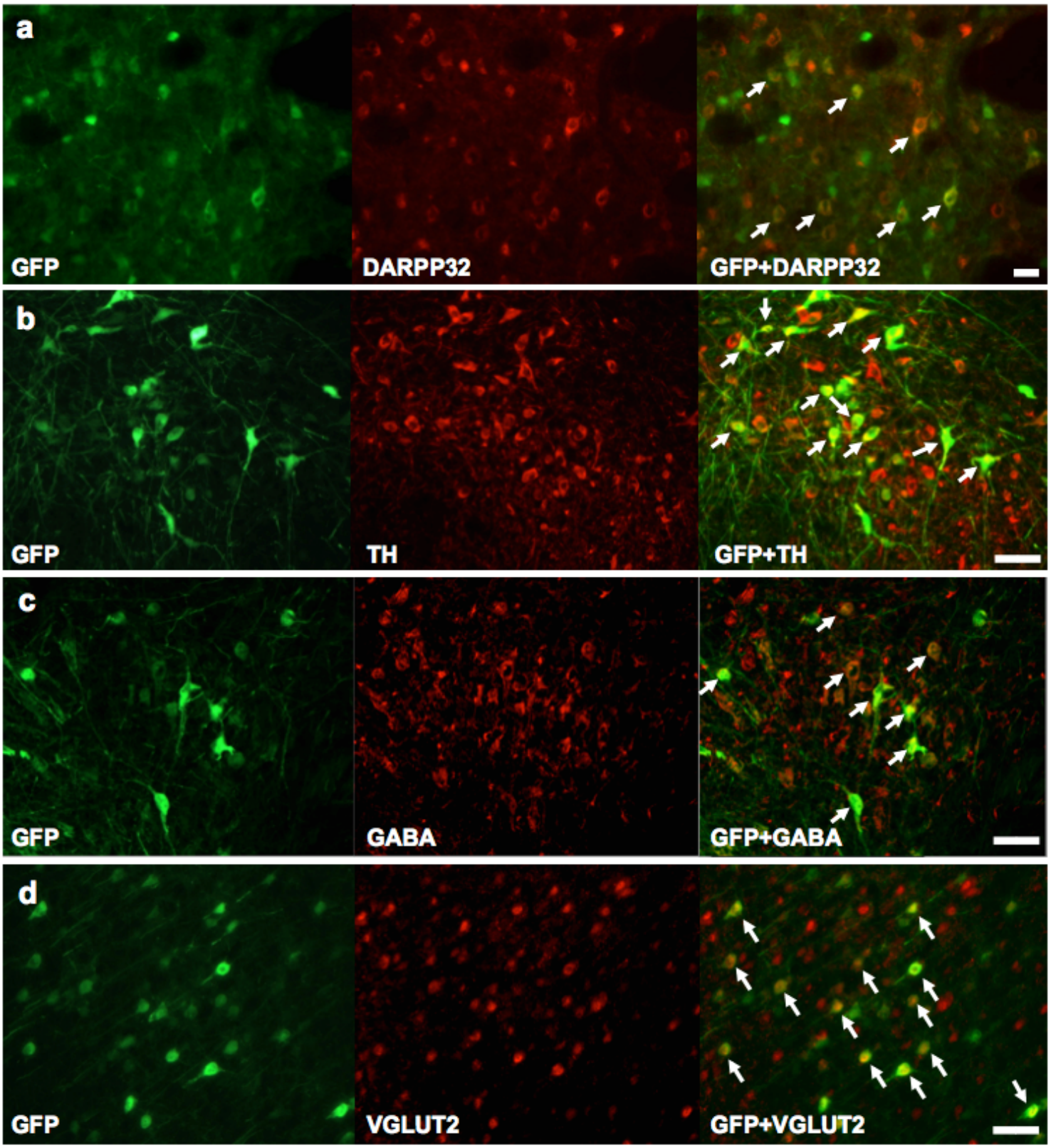
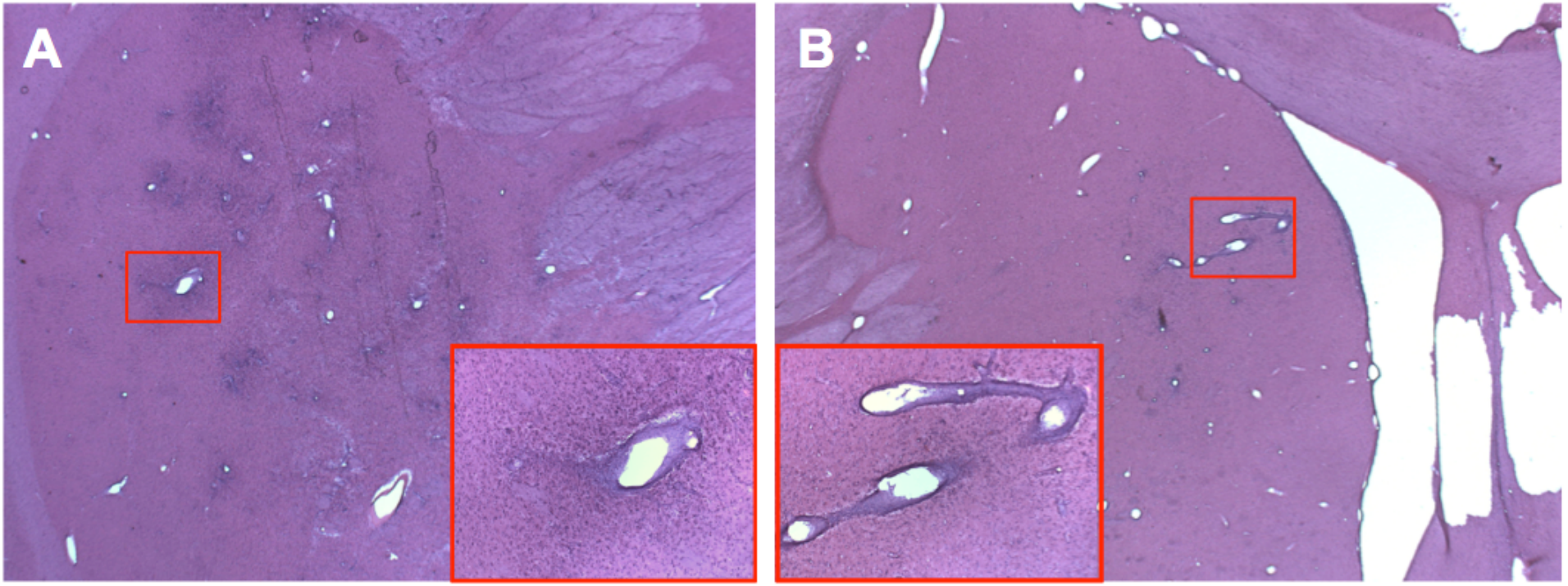
SUPPLEMENTARY MATERIALS

Figure S1. Characterization of neuronal subtypes transduced by AAV1-eGFP and AAV2-eGFP injected into the monkey brain.



Monkey brain sections were processed for double immunofluorescent staining against GFP and various cellular markers to determine subtypes of neurons transduced by the injected vectors. **(a)** Section from putamen (target structure) from monkey MMU39956 stained with antibodies against GFP (green channel for DyLight™ 488 dye) and DARPP-32 (for GABAergic medium spinal neurons, MSN, of the striatum) detected in red channel for DyLight™ 549 dye. Merged pictures from both channels show numerous neurons expressing GFP (white arrows), verifying transduction of striatal medium spinal neurons by AAV1-eGFP. Monkeys injected with AAV2-eGFP showed similar results (data not shown); size bar - 25 μm. **(b)** Section from substantia nigra pars compacta (projected structure) from monkey MMU39956 stained with antibodies against GFP (green channel for DyLight™ 488 dye) and TH (tyrosine hydroxylase, marker for dopaminergic neurons) detected in red channel for DyLight™ 549 dye. Neuronal dopaminergic transduction in this distal brain structure receiving neuronal projections from the striatum is the evidence of retrograde transport of AAV1-eGFP (white arrows). Monkeys from all groups (also injected with AAV2-eGFP) showed identical results (not shown here); size bar - 50 μm. **(c)** Section from substantia nigra pars reticulata (projected structure) from monkey MMU39819 stained with antibodies against GFP (green channel for DyLight™ 488 dye) and GABA (γ-aminobutyric acid, marker for GABAergic neurons) detected in red channel for DyLight™ 549 dye. Neuronal transduction in this distal brain structure receiving neuronal projections from the striatum is the evidence of anterograde transport of AAV2-eGFP (white arrows). Monkeys from all groups (also injected with AAV1-eGFP) showed identical results (not shown here); size bar - 50 μm. **(d)** Section from prefrontal cortex (projected structure) from monkey MMU39819 stained with antibodies against GFP (green channel for DyLight™ 488 dye) and VGLUT-2 (vesicular glutamate transporter 2, marker for glutamatergic neurons) detected in red channel for DyLight™ 549 dye. Neuronal transduction of the cortex receiving projections from the striatum is the evidence of retrograde transport of AAV2-eGFP (white arrows). Monkeys from all groups (also injected with AAV1-eGFP) showed identical results (not shown here); size bar - 50 μm.

Figure S2. Vector-related histological findings



Independent evaluation of hematoxylin and eosin (H&E) staining of coronal sections from areas of primary transduction (PAT) revealed normal gliosis related to cannula insertion in all experimental groups. H&E staining also revealed perivascular cellular infiltrates in all animals regardless of the vector used. The incidence and severity of perivascular cuffs was increased in groups injected with AAV1, especially when the vector was prepared by the TT method. **Panel A**: H&E-stained section from monkey MMU39819 shows numerous perivascular cuffs in the left putamen transduced with AAV1-eGFP (TT). One blood vessel is magnified (5X) in the right bottom corner. **Panel B**: H&E-stained section from monkey MMU39553 shows only a few localized perivascular cuffs in the left caudate nucleus transduced with AAV1-eGFP (PCL). A few blood vessels are magnified (5X) in the left bottom corner.

Table S1. Infusion of AAV1-eGFP and AAV2-eGFP into the NHP brain and the extent of vector distribution within the brain 4 weeks after transduction

NHP subjects	V_d/V_i [a]	Gadolinium coverage [b]		Striatal GFP coverage [c]		Cortical GFP coverage [d]
AAV1-eGFP						
MMU39956 AAV1-eGFP (TT)	Putamen: 3.2 Caudate: 2.1	Put_L 34.8% Cd_L 14.8%	Put_R 30.2% Cd_R 16.2%	Put_L 81.6% Cd_L 80.0%	Put_R 95.7% Cd_R 76.4%	91%
MMU38591 AAV1-eGFP (TT)	Putamen: 3.1 Caudate: 3.2	Put_L 35.7% Cd_L 18.2%	Put_R 18.3% Cd_R 13.8%	Put_L 87.9% Cd_L 72.8%	Put_R 74.4% Cd_R 69.7%	50%
MMU39819 AAV1-eGFP (TT)	Putamen: 3.3 Caudate: 2.2	Put_L 52.7% Cd_L 19.4%	Put_R 37.8% Cd_R 21.2%	Put_L 84.6% Cd_L 76.9%	Put_R 93.2% Cd_R 78.7%	41%
MMU40167 AAV1-eGFP (PCL)	Putamen: 3.0 Caudate: 2.3	Put_L 23.3% Cd_L 23.8%	Put_R 17.7% Cd_R 20.6%	Put_L 94.5% Cd_L 93.9%	Put_R 86.9% Cd_R 91.7%	61%
MMU39553 AAV1-eGFP (PCL)	Putamen: 2.7 Caudate: 2.8	Put_L 22.3% Cd_L 26.8%	Put_R 22.2% Cd_R 8.6%	Put_L 85.2% Cd_L 76.5%	Put_R 83.9% Cd_R 87.5%	68%
AAV2-eGFP						
MMU39388 AAV2-eGFP (TT)	Putamen: 2.7 Caudate: 3.7	Put_L 22.7% Cd_L 20.0%	Put_R 16.2% Cd_R 23.0%	Put_L 72.1% Cd_L 67.1%	Put_R 82.9% Cd_R 71.5%	75%
MMU37806 AAV2-eGFP (TT)	Putamen: 2.9 Caudate: 3.9	Put_L 11.3% Cd_L 20.6%	Put_R 16.3% Cd_R 15.2%	Put_L 61.1% Cd_L 57.9%	Put_R 71.8% Cd_R 61.4%	47%
MMU39417 AAV2-eGFP (PCL)	Putamen: 2.4 Caudate: 3.4	Put_L 36.0% Cd_L 34.0%	Put_R 19.8% Cd_R 39.4%	Put_L 69.7% Cd_L 60.9%	Put_R 52.3% Cd_R 77.4%	50%
MMU39808 AAV2-eGFP (PCL)	Putamen: 4.6 Caudate: 2.7	Put_L 35.2% Cd_L 21.2%	Put_R 30.5% Cd_R 23.4%	Put_L 94.1% Cd_L 72.0%	Put_R 73.6% Cd_R 75.2%	73%

[a] Ratio of volume of distribution (Vd) to volume of infusion (Vd) was calculated (OsiriX Imaging software, v. 3.1) by dividing the volume of vector distribution within the injected brain parenchyma (based on the Gadolinium signal from MRI scans) by the volume of the injected vector. Values from left and right hemispheres were added to determine the average Vd/Vi for each animal.

[b] Gadolinium coverage within targeted structures was calculated (OsiriX Imaging software, v. 3.1) by dividing Vd by the volume of Putamen (600 mm^3) or Caudate (500 mm^3).

[c] Striatal GFP expression coverage was calculated from IHC-stained sections by dividing the area (mm^2) of GFP signal by the area of the targeted structure (caudate and putamen for each animal were calculated separately and expressed as percentage of GFP coverage).

[d] Cortical GFP coverage was calculated by projecting GFP signal from matching IHC-stained sections onto corresponding MRI scans of each monkey.

Table S2. Efficiency of neuronal transduction by AAV1-eGFP and AAV2-eGFP vectors within the striatal primary areas of transduction (PAT) and the cortex of the non-human primate brain

Targeted region	MMU39956 ***AAV1-eGFP (TT)***	MMU38591 ***AAV1-eGFP (TT)***	MMU39819 ***AAV1-eGFP (TT)***	MMU39388 ***AAV2-eGFP (TT)***	MMU37806 ***AAV2-eGFP (TT)***
Left putamen	**57.0 ± 7.8 %**	**64.4 ± 11.8 %**	**54.7 ± 11.4 %**	**36.5 ± 8.9 %**	**59.6 ± 12.8 %**
Right putamen	**68.0 ± 15.9 %**	**70.1 ± 14.4 %**	**66.3 ± 19.9 %**	**33.1 ± 11.7 %**	**56.4 ± 7.8 %**
Left caudate	**70.1 ± 14.7 %**	**72.6 ± 13.3 %**	**56.4 ± 6.0 %**	**33.7 ± 11.4 %**	**61.4 ± 13.1 %**
Right caudate	**65.6 ± 7.4 %**	**65.1 ± 13.9 %**	**60.1 ± 5.7 %**	**42.7 ± 10.5 %**	**49.4 ± 13.5 %**
Cortex*	**24.9 ± 3.0 %**	**4.0 ± 2.8 %**	**6.7 ± 3.4 %**	**8.6 ± 2.8 %**	**3.4 ± 1.8 %**

Targeted region	MMU39553 ***AAV1-eGFP (PCL)***	MMU40167 ***AAV1-eGFP (PCL)***	MMU39808 ***AAV2-eGFP (PCL)***	MMU39417 ***AAV2-eGFP (PCL)***
Left putamen	**58.6 ± 7.6 %**	**57.1 ± 10. 5%**	**53.1 ± 12.7 %**	**52.4 ± 11.9 %**
Right putamen	**48.3 ± 11.7 %**	**73.2 ± 9.9 %**	**52.1 ± 10.6 %**	**50.2 ± 4.5 %**
Left caudate	**57.0 ± 7.1 %**	**52.3 ± 11.8 %**	**43.0 ± 14.6 %**	**43.4 ± 8.5 %**
Right caudate	**59.1 ± 9.1 %**	**70.5 ± 8.0 %**	**52.1 ± 7.2 %**	**61.2 ± 13.0 %**
Cortex*	**16.4 ± 5.1 %**	**16.1 ± 6.6 %**	**23.0 ± 7.6 %**	**18.7 ± 5.4 %**

* Neuronal transduction by AAV vectors was also detected in cortical regions projected from the striatum (target structure). The efficiency of cortical transduction was calculated in coronal sections of the striatal plane with injection sites.

Table S3. Efficiency of neuronal transduction by AAV1-eGFP and AAV2-eGFP vectors within the striatum but outside the primary areas of transduction (OPAT) of the non-human primate brain

Targeted region	MMU39956 ***AAV1-eGFP (TT)***	MMU38591 ***AAV1-eGFP (TT)***	MMU39819 ***AAV1-eGFP (TT)***	MMU39388 ***AAV2-eGFP (TT)***	MMU37806 ***AAV2-eGFP (TT)***
Left putamen	**14.3 ± 9.5 %**	**8.9 ± 6.0 %**	**14.2 ± 7.9 %**	**0.6 ± 0.5 %**	**1.3 ± 0.7 %**
Right putamen	**4.4 ± 2.1 %**	**4.0 ± 4.4 %**	**5.3 ± 3.7 %**	**0.5 ± 0.6 %**	**0.8 ± 0.6 %**
Left caudate	**10.2 ± 7.4 %**	**2.0 ± 2.5 %**	**9.1 ± 5.2 %**	**0.9 ± 1.0 %**	**0.7 ± 0.4 %**
Right caudate	**10.9 ± 6.4 %**	**6.9 ± 5.6 %**	**8.8 ± 3.6 %**	**0.5 ± 0.9 %**	**0.7 ± 0.9 %**

Targeted region	MMU39553 ***AAV1-eGFP (PCL)***	MMU40167 ***AAV1-eGFP (PCL)***	MMU39808 ***AAV2-eGFP (PCL)***	MMU39417 ***AAV2-eGFP (PCL)***
Left putamen	**2.5 ± 2.1%**	**12.3 ± 6.3 %**	**1.2 ± 0.9 %**	**2.0 ± 2.2 %**
Right putamen	**3.6 ± 3.0 %**	**9.8 ± 5.6 %**	**1.2 ± 1.2 %**	**2.7 ± 0.9 %**
Left caudate	**7.1 ± 4.6 %**	**10.0 ± 5.5 %**	**0.8 ± 0.6 %**	**3.6 ± 3.2 %**
Right caudate	**7.0 ± 5.8 %**	**4.2 ± 2.9 %**	**1.1 ± 0.7 %**	**2.0 ± 1.3 %**